EFFECT OF ELEVATED IONIZED AMMONIUM (NH_4^+) CONCENTRATIONS ON GROWTH PERFORMANCE AND MORTALITY OF BURBOT (*LOTA LOTA* L.)

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Introduction

Recently, burbot has been introduced as a new aquaculture species in Belgium for both flow-through and recirculating aquaculture systems (RAS). While this fish species can be successfully cultured in RAS, the impact of long-term exposure to high concentrations of NH_4^+ on burbot performance is unknown. The effects of toxic un-ionized ammonia (NH_3) are well-studied for several aquaculture species, but there appears to be no literature on the chronic effects of elevated ionized NH_4^+ concentrations. For commercial farms, it is crucial to identify the maximum tolerable NH_4^+ concentration, in order to adequately dimension the biofilter capacity.

Aims

In order to design an optimal RAS for intensive burbot aquaculture, this species' tolerance towards NH_4^+ has to be determined. Therefore, the effect of elevated NH_4^+ concentrations on burbot growth performance and mortality was evaluated.

Materials and Methods

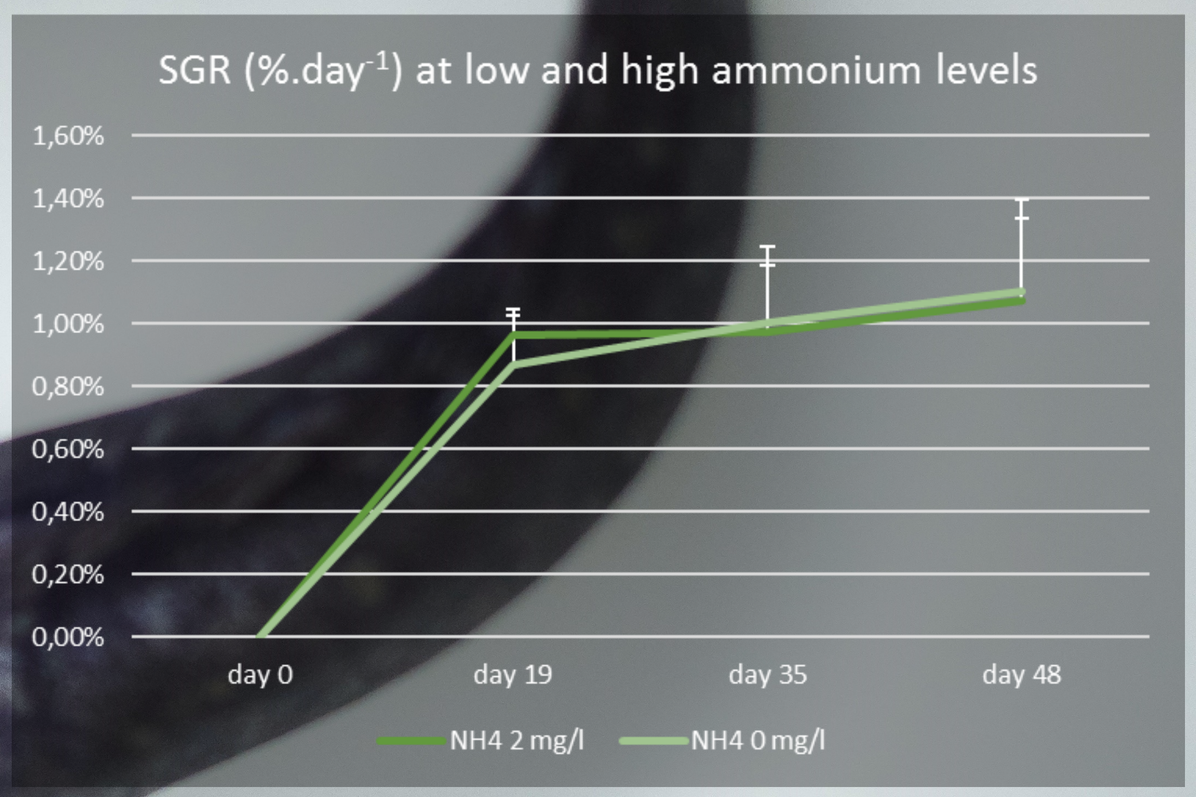
Burbots with an average body weight of 47.11 ± 7.97 g were stocked in six 50 liter aquaria at a density of 30 fish per aquarium. The fish were exposed to two NH_4^+ concentrations: 0.09 ± 0.22 $mg.l^{-1}$ and 1.94 ± 0.48 $mg.l^{-1}$. They were raised in these conditions for 48 days and weighed and measured every two weeks.

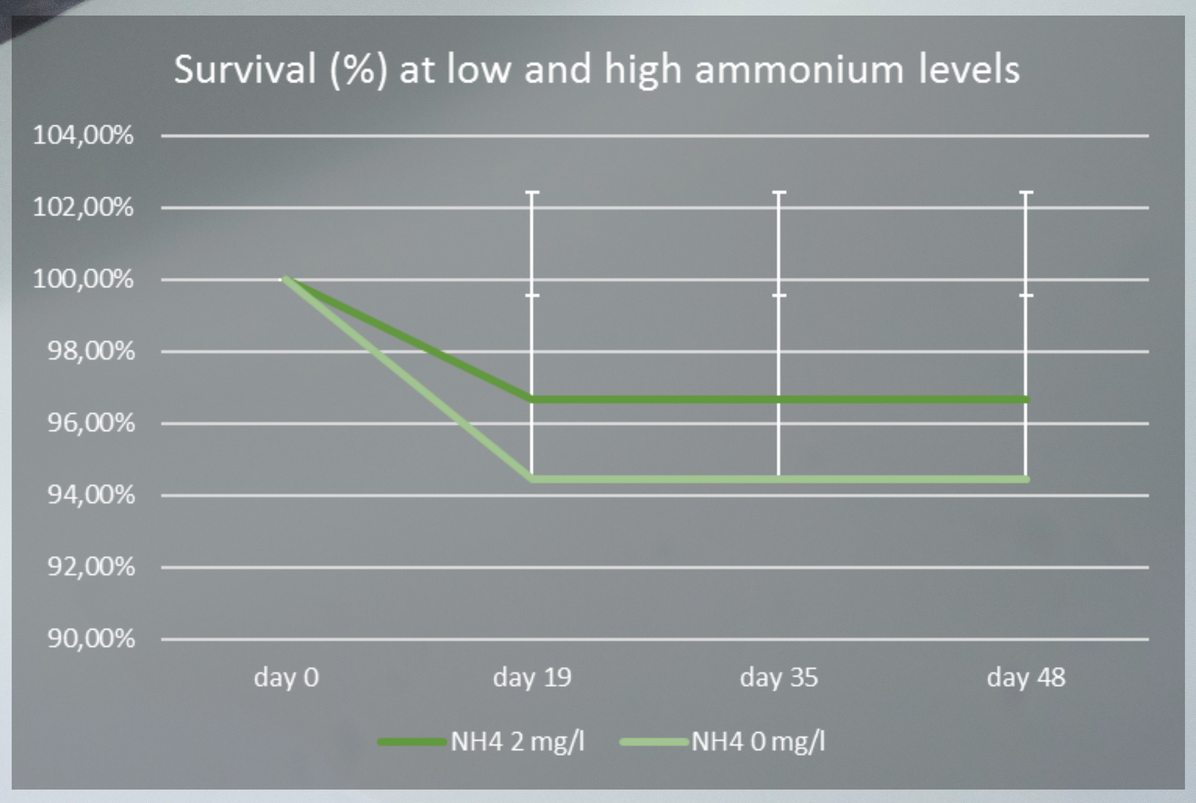
Results

Burbots reared at high and low NH_4^+ concentrations showed specific growth rates (SGR) of 0.80 ± 0.13 $\%.day^{-1}$ and 0.77 ± 0.16 $\%.day^{-1}$ respectively. Survival was 96.67 ± 5.77% in the high NH_4^+ treatment and 94.44 ± 5.09% in the low NH_4^+ treatment. We observed no significant effects of the elevated NH_4^+ concentration on SGR (Mann-Whitney U test , $p>0.05$) or mortality (mixed linear model, $p>0.05$).

Conclusion

In this study, an NH_4^+ concentration up to 1.94 $mg.l^{-1}$ did not affect burbot growth performance or mortality. Based on these observations, we assume this level of NH_4^+ is safe for burbot grow-out in RAS, providing the formation of toxic NH_3 is prevented by suitable water quality management. In order to determine the maximum NH_4^+ tolerance for burbot, the effects of exposure to higher concentrations should be tested.





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